

Questions 11-20 are based on the following passage and supplementary material.

This passage is adapted from “How the Web Affects Memory.” ©2011 by Harvard Magazine Inc.

Search engines have changed the way we use the Internet, putting vast sources of information just a few clicks away. But Harvard professor of psychology
 Line Daniel Wegner’s recent research proves that
 5 websites—and the Internet—are changing much more than technology itself. They are changing the way our memories function.

Wegner’s latest study, “Google Effects on Memory: Cognitive Consequences of Having
 10 Information at Our Fingertips,” shows that when people have access to search engines, they remember fewer facts and less information because they know they can rely on “search” as a readily available shortcut.

15 Wegner, the senior author of the study, believes the new findings show that the Internet has become part of a transactive memory source, a method by which our brains compartmentalize information. First hypothesized by Wegner in 1985, transactive
 20 memory exists in many forms, as when a husband relies on his wife to remember a relative’s birthday. “[It is] this whole network of memory where you don’t have to remember everything in the world yourself,” he says. “You just have to remember who
 25 knows it.” Now computers and technology as well are becoming virtual extensions of our memory.

The idea validates habits already forming in our daily lives. Cell phones have become the primary location for phone numbers. GPS devices in cars
 30 remove the need to memorize directions.

Wegner points out that we never have to stretch our memories too far to remember the name of an obscure movie actor or the capital of Kyrgyzstan—we just type our questions into Google. “We become
 35 part of the Internet in a way,” he says. “We become part of the system and we end up trusting it.”

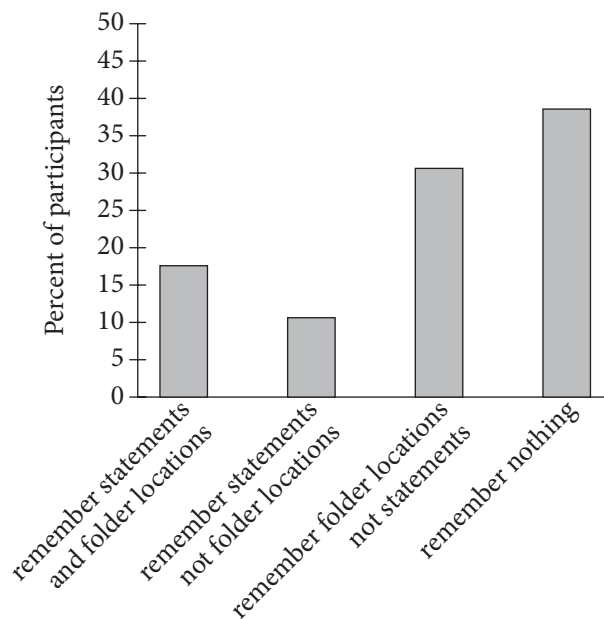
Working with researchers Betsy Sparrow of Columbia University and Jenny Liu of the University of Wisconsin–Madison, Wegner conducted four

40 experiments to demonstrate the phenomenon, using various forms of memory recall to test reliance on computers. In the first experiment, participants demonstrated that they were more likely to think of computer terms like “Yahoo” or “Google” after being
 45 asked a set of difficult trivia questions. In two other experiments, participants were asked to type a collection of readily memorable statements, such as “An ostrich’s eye is bigger than its brain.” Half the subjects were told that their work would be saved to a
 50 computer; the other half were informed that the statements would be erased. In subsequent memory testing, participants who were told their work would not be saved were best at recalling the statements. In a fourth experiment, participants typed into a
 55 computer statements they were told would be saved in specific folders. Next, they were asked to recall the statements. Finally, they were given cues to the wording and asked to name the folders where the statements were stored. The participants proved
 60 better able to recall the folder locations than the statements themselves.

Wegner concedes that questions remain about whether dependence on computers will affect memories negatively: “Nobody knows now what the
 65 effects are of these tools on logical thinking.” Students who have trouble remembering distinct facts, for example, may struggle to employ those facts in critical thinking. But he believes that the situation overall is beneficial, likening dependence on
 70 computers to dependence on a mechanical hand or other prosthetic device.

And even though we may not be taxing our memories to recall distinct facts, we are still using them to consider where the facts are located and how
 75 to access them. “We still have to remember things,” Wegner explains. “We’re just remembering a different range of things.” He believes his study will lead to further research into understanding computer dependence, and looks forward to tracing the extent
 80 of human *interdependence* with the computer world—pinpointing the “movable dividing line between us and our computers in cyber networks.”

Results of Experiment 4: Memory of Statements and Folder Locations



Adapted from Betsy Sparrow et al., "Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips." ©2011 by American Association for the Advancement of Science.

11

The main purpose of the passage is to

- A) describe a series of experiments on the way technology interferes with critical thinking.
- B) assert that people have become overly dependent on computers for storing information.
- C) discuss the idea that humans' capacity for memory is much weaker than it once was.
- D) share the findings of a study examining the effect of computer use on memory recall.

12

Which choice best supports the idea that reliance on computers does not necessarily diminish human memory?

- A) Lines 3-6 ("But Harvard . . . itself")
- B) Lines 31-33 ("Wegner . . . Kyrgyzstan")
- C) Lines 66-68 ("Students . . . thinking")
- D) Lines 72-75 ("And even . . . them")

13

In context, the reference to remembering a relative's birthday mainly serves to

- A) show that people who are closely related tend to have shared memories.
- B) demonstrate how people initially developed external sources of memory.
- C) emphasize the effectiveness and accuracy of transactive memory sources.
- D) illustrate the concept of a transactive memory source using a familiar situation.

14

Based on the information in the passage, which of the following would be considered a transactive memory source?

- A) A souvenir brought home from a memorable trip
- B) A written list of a user's passwords for different websites
- C) A library database that helps users locate specific books
- D) A website that helps users plan and make travel arrangements

15

As used in line 26, "extensions of" most nearly means

- A) delays in.
- B) additions to.
- C) lengths of.
- D) developments of.

16

The discussion of the experiments suggests that people are inclined to think of specific information sources in response to being

- A) required to memorize details that will then be made inaccessible.
- B) directed to develop a system for organizing and saving content.
- C) asked to provide facts that are not already familiar to them.
- D) prompted to identify terms related to dependence on computers.

17

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 42-45 ("In the . . . questions")
- B) Lines 48-51 ("Half . . . erased")
- C) Lines 51-53 ("In subsequent . . . statements")
- D) Lines 59-61 ("The participants . . . themselves")

18

As used in line 67, "employ" most nearly means

- A) utilize.
- B) enroll.
- C) exert.
- D) assign.

19

According to the graph, approximately what percentage of participants remembered both parts of the information given to them during the fourth experiment?

- A) 7%
- B) 10%
- C) 17%
- D) 30%

20

Based on the description of Wegner’s fourth experiment, what is the most likely explanation for the findings for the largest single group of participants represented in the graph?

- A) Those participants focused on remembering the folder locations.
- B) Those participants attempted to remember the statements and the folder locations.
- C) Those participants did not attempt to remember any specific pieces of information.
- D) There is not enough information to determine the cause of the results for those participants.

Questions 21-31 are based on the following passage and supplementary material.

This passage is adapted from Marlene Zuk, *Paleofantasy: What Evolution Really Tells Us about Sex, Diet, and How We Live*. ©2013 by Marlene Zuk.

A female guppy can be sexually mature at two months of age and have her first babies just a month later. This unstinting rate of reproduction makes guppies ideally suited for studying the rate of evolution, and David Reznick, a biologist at UC Riverside, has been doing exactly that for the last few decades.

People usually think of guppies as colorful aquarium fish, but they also have a life in the real world, inhabiting streams and rivers in tropical places like Trinidad, where Reznick has done his fieldwork. Guppies can experience different kinds of conditions depending on the luck of the draw.

A lucky guppy is born above a waterfall or a set of rapids, which keep out the predatory fish called pike cichlids found in calmer downstream waters. As you might expect, the guppy mortality rate—that is, the proportion of individuals that die—is much higher in the sites with the rapacious cichlids than in those without them.

Reznick has shown that if you bring the fish into the lab and let them breed there, the guppies from the sites with many predators become sexually mature when they are younger and smaller than do the guppies from the predator-free sites. In addition, the litters of baby guppies produced by mothers from the high-risk streams are larger, but each individual baby is smaller than those produced by their counterparts. The disparity makes sense because if you are at risk of being eaten, being able to have babies sooner, and spreading your energy reserves over a lot of them, makes it more likely that you will manage to pass on some of your genes before you meet your fate. Reznick and other scientists also demonstrated that these traits are controlled by the guppies’ genes, not by the environment in which they grow up.

How quickly, though, could these differences in how the two kinds of guppies lived their lives have evolved? Because there are numerous tributaries of the streams in Trinidad, with guppies living in some but not all of them, Reznick realized that he could, as he put it in a 2008 paper, “treat streams like giant test tubes by introducing guppies or predators” to places they had not originally occurred, and then watch as